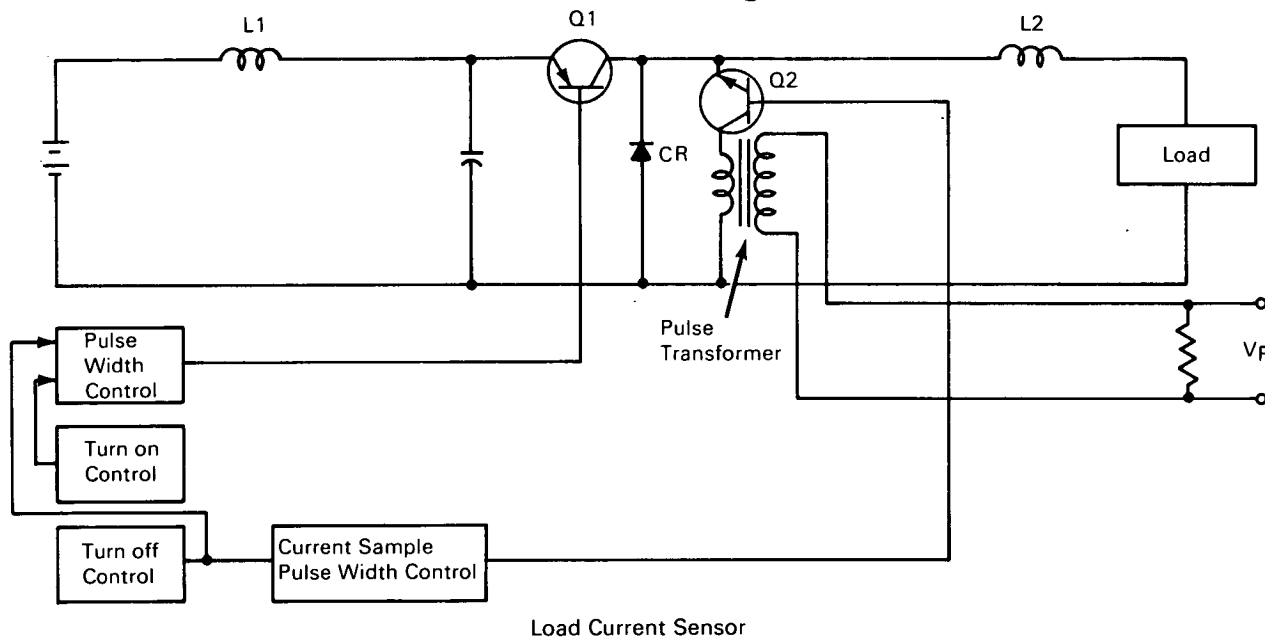


NASA TECH BRIEF



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Load Current Sensor for a Pulse Width Modulator Power Regulator



The problem:

Conventional load current sensor circuits have the inadequacies of requiring operating power from the load circuit, additional amplification to bring the sensed current to a convenient signal level, and a series dropping device between the load and common ground.

The solution:

A circuit was designed using a pulse transformer which enables the sensor to operate for a short portion of the duty cycle. Current drawn from the load is minimized and a high impedance is reflected to the load.

How it's done:

The regulator transistor Q1 is controlled through a current amplifier from a pulse width control circuit. One such circuit consists of a flip-flop which is set and cleared by pulses from unijunction oscillator timers. The timers are synchronized to start simultaneously, but the turn-off timer, controlled indirectly by the load or charge current, elapses sooner than the turn-on timer.

In one particular application it is used in a battery charger circuit. A voltage threshold detector monitors the cell voltage and when full charge is reached, a disable signal is applied to the turn-on timer which stops the charge current. Conversely, a reset signal is

(continued overleaf)

applied to the cell voltage sensor when high current is demanded from the system.

The load current regulator operates by sampling the current sustained by inductor L2 through the "free-wheeling" leg of the circuit for a short period of time after Q1 turns off; the current is sampled by turning on transistor Q2 which permits the load current to flow through the primary winding of the pulse transformer. The parameters of the transformer and its secondary load are chosen such that an insignificant portion of the load current flows through diode CR during the sample time. When transistor Q2 is turned off, the load current flows through diode CR until Q1 is turned on again.

This load sensor circuit can also be used as a current limiter or for short-circuit current protection.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland 20771
Reference: TSP69-10578

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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